Iowa Association of Naturalists

Iowa's Plants

Iowa's Trees

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The Iowa Association of Naturalists (IAN) is a nonprofit organization of people interested in promoting the development of skills and education within the art of interpreting the natural and cultural environment. IAN was founded in 1978 and may be contacted by writing the Conservation Education Center, RR 1, Box 53, Guthrie Center, IA 50115.

Iowa's Plants Booklet Series

Plants are a beautiful and important part of nature in Iowa. To assist educators in teaching their students about the common plants of Iowa, the Iowa Association of Naturalists has created a series of booklets which offer a basic, understandable overview of Iowa's plants, their ecology, and their benefits and dangers to people. The seven booklets in this series include:

Iowa's Spring Wildflowers (*IAN-301*)
Iowa's Summer and Fall Wildflowers (*IAN-302*)
Benefits and Dangers of Iowa Plants (*IAN-303*)
Iowa's Trees (*IAN-304*)
Seeds, Nuts, and Fruits of Iowa Plants (*IAN-305*)
Iowa's Mushrooms and Nonflowering Plants (*IAN-306*)
Iowa's Shrubs and Vines (*IAN-307*)

For ordering information about these and other IAN publications, please see the back cover of this booklet.

REAP
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Education Board

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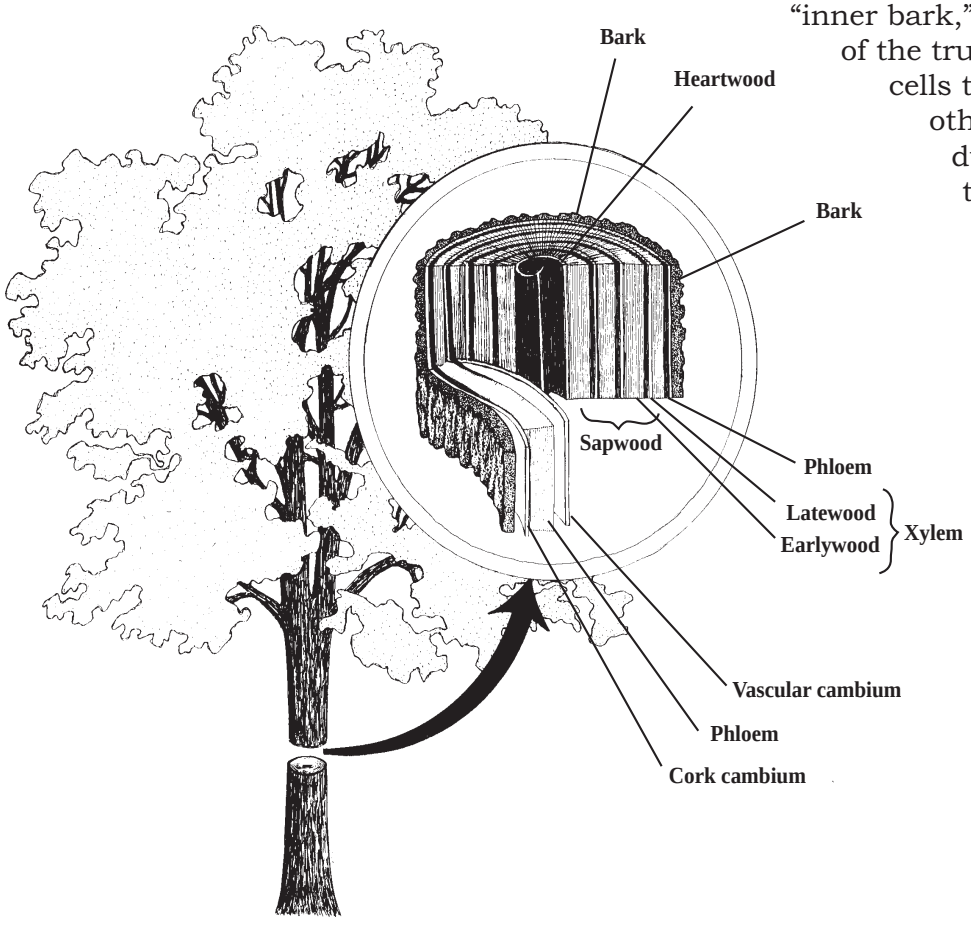
Iowa's Trees

What Is a Tree?

How would you describe a tree? Trees are woody plants which, at maturity, are more that 20 feet tall and have a single trunk. Trees have underground woody roots, trunks, and branches that provide physical support to allow them to grow tall. Most Iowa trees grow at least 25 feet tall and have a stem or trunk that is at least three to four inches in diameter.

Parts of a Tree

The trunk of a tree gives the tree its support and its shape. The trunk also contains a network of cells that carries water and food throughout the tree. Several basic layers of cells make up a tree. The **bark** is the outer layer of the trunk and branches that protects the tree from injury and disease. Different tree species have different types of bark textures and colors. **Phloem,** called the "inner bark," is just inside the bark of the trunk. This thin layer of cells transports sugars and other compounds produced by the leaves to the rest of the tree.



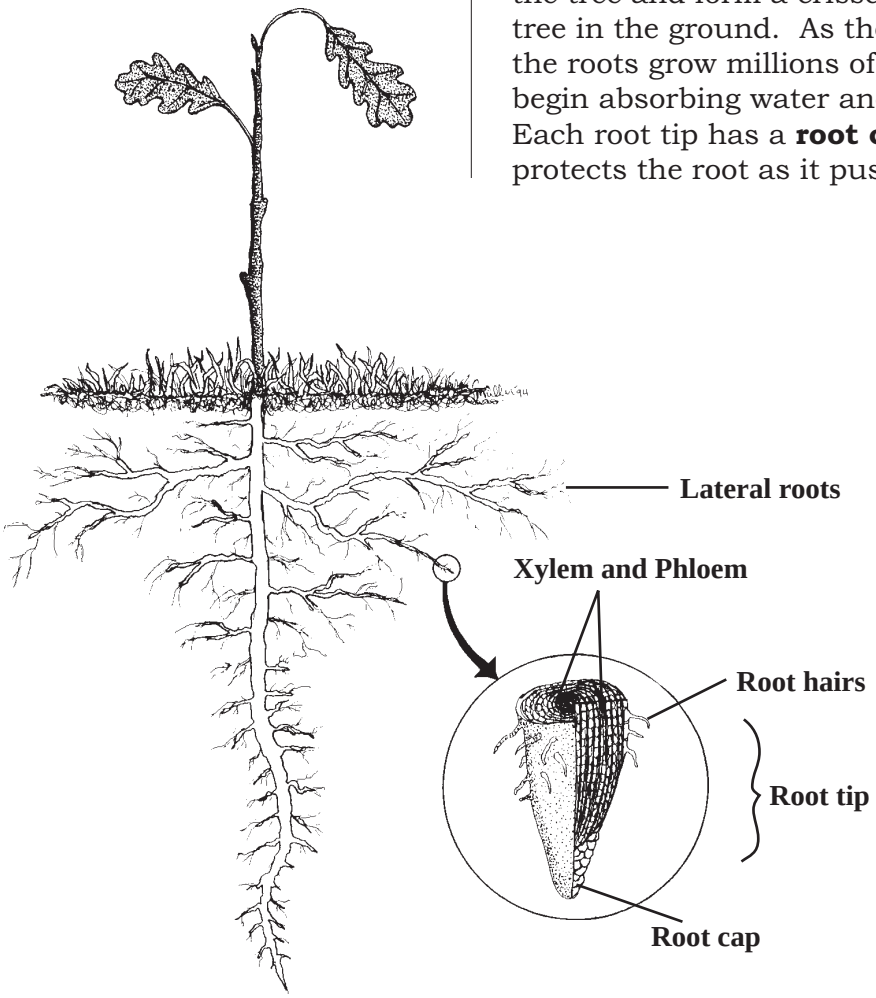
The living portion of the **xylem** is the **sapwood.** These cells are the newest layers of woody tissue. The sapwood cells serve as a pipeline that carries water and minerals from the roots to other parts of the tree. The **cambium** is another very thin layer of cells located between the phloem and the xylem. This layer of cells is responsible for the diameter growth of the tree. It divides

on the outside to produce phloem cells and on the inside to produce xylem cells.

Heartwood is the inner part of the tree. It is old xylem that no longer transports water and is considered "dead" wood. Often, heartwood is darker in color than the sapwood. Most of the time, it gives the tree support, but in some trees the heartwood may rot, leaving a hollow living tree.

Roots and How They Grow

In Iowa, the yearly cycle of growth begins with the roots. A seedling's first roots grow straight down. Its **lateral roots** spread out from the base of the tree and form a crisscross pattern that holds the tree in the ground. As the soil warms in the spring, the roots grow millions of new **root hairs** which begin absorbing water and nutrients from the soil. Each root tip has a **root cap** or zone of growth that protects the root as it pushes forward.

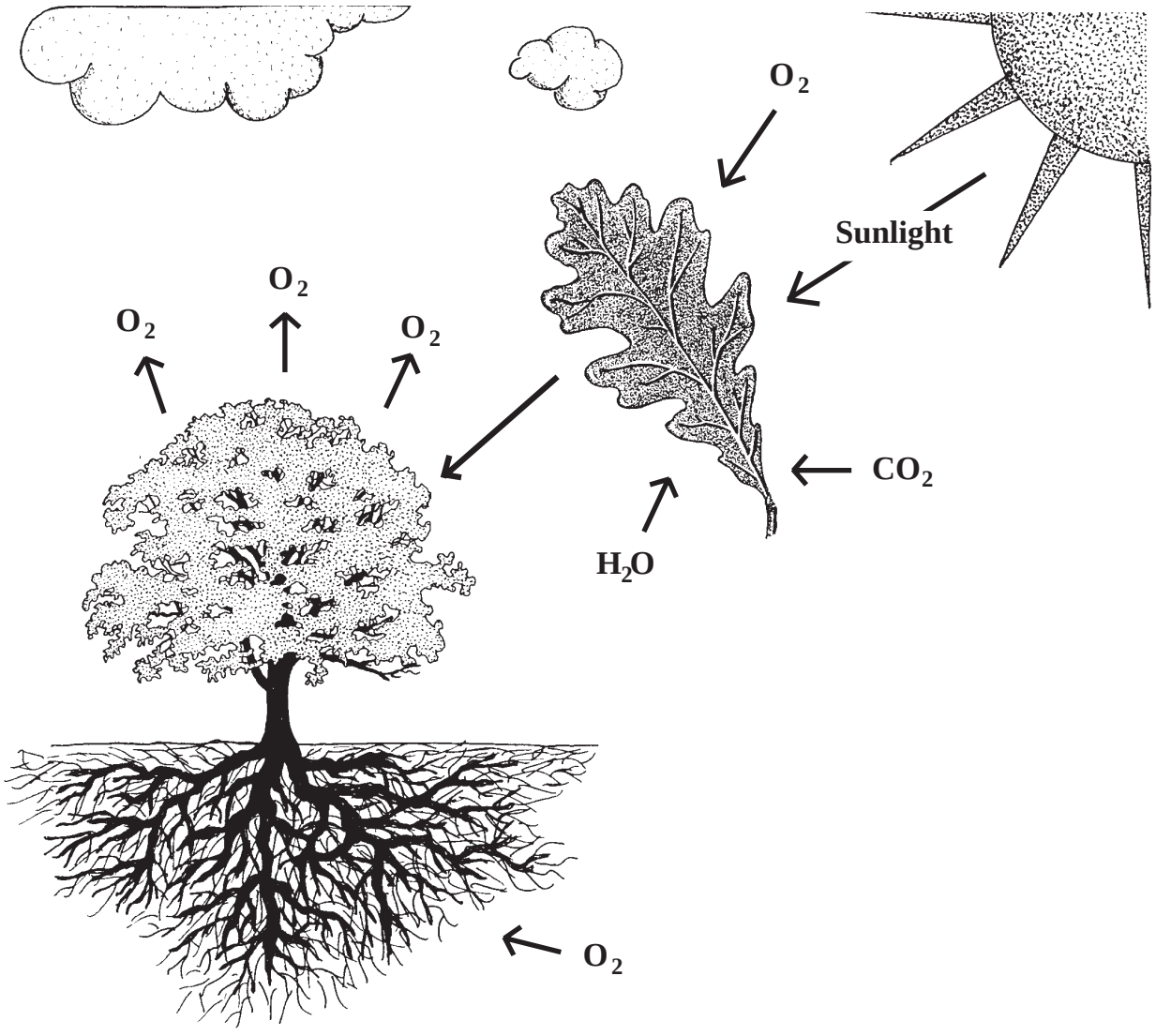


Cambium cells present in the roots divide, and the roots get wider. Cells forming the outside of the cambium become phloem cells and old phloem cells form new bark. Cells forming to the inside of the cambium form the xylem or wood of the tree. Growth in the root tips makes the roots longer and able to spread out in search of more water and nutrients.

Trees and the Oxygen Cycle

Trees need oxygen in order to break down sugars and release energy. Cells in the leaves, trunk, branches, and twigs absorb oxygen from the air; the roots absorb oxygen from the soil. Carbon dioxide from the atmosphere is used by green plants to make food through a chemical process called **photosynthesis.**

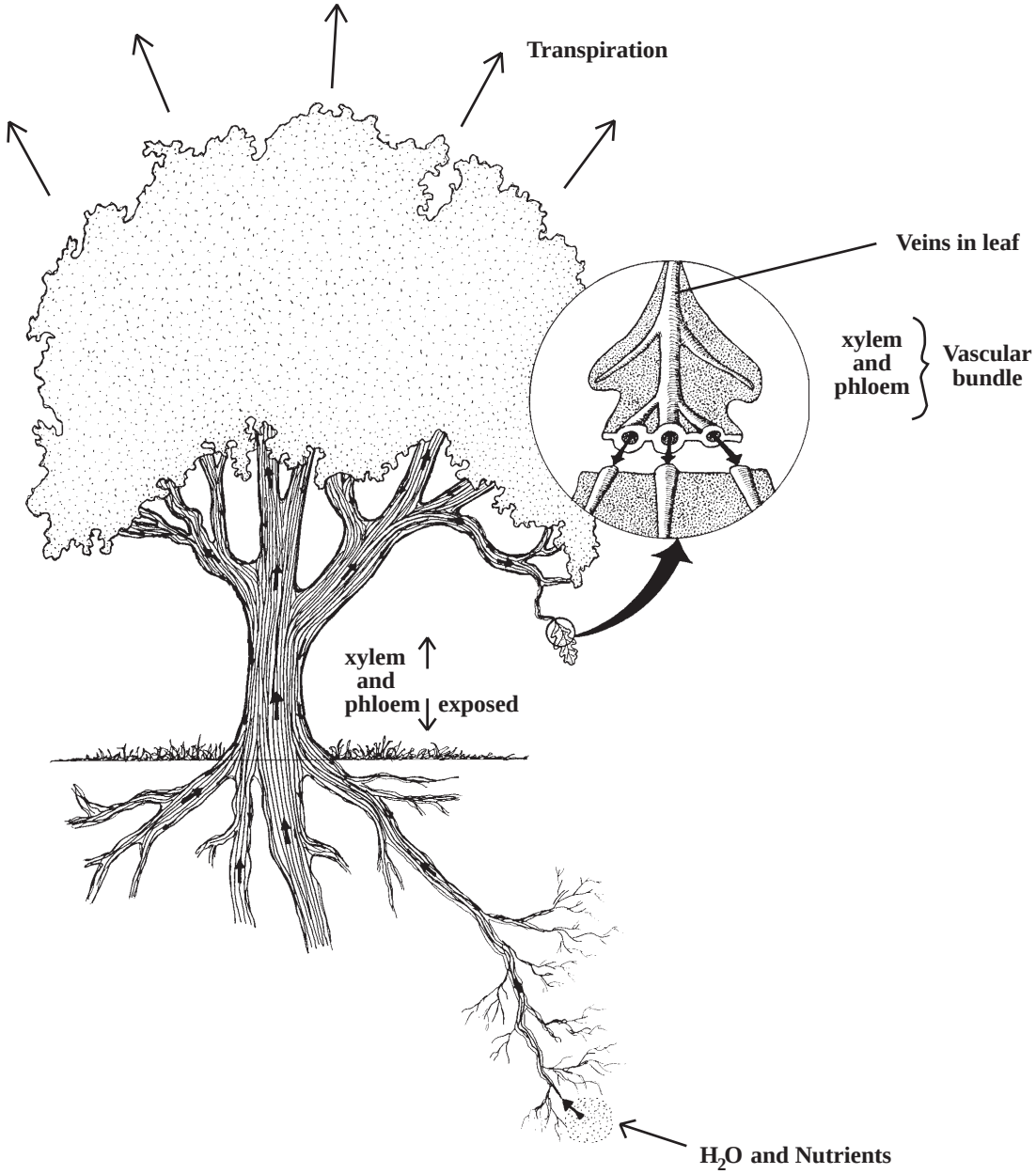
During photosynthesis, energy from the sun is captured by green plants to manufacture food, and oxygen is released. Photosynthesis mostly occurs in the tree's leaves where carbon dioxide, water, and sunlight, in the presence of the tree's **chlorophyll,** are used to make sugar. In the process, oxygen is released into the atmosphere. For the tree to break down those sugars, a process called **respiration** must occur. Energy is released during respiration as oxygen is removed from the air and sugar is consumed.



Transportation of Water and Nutrients

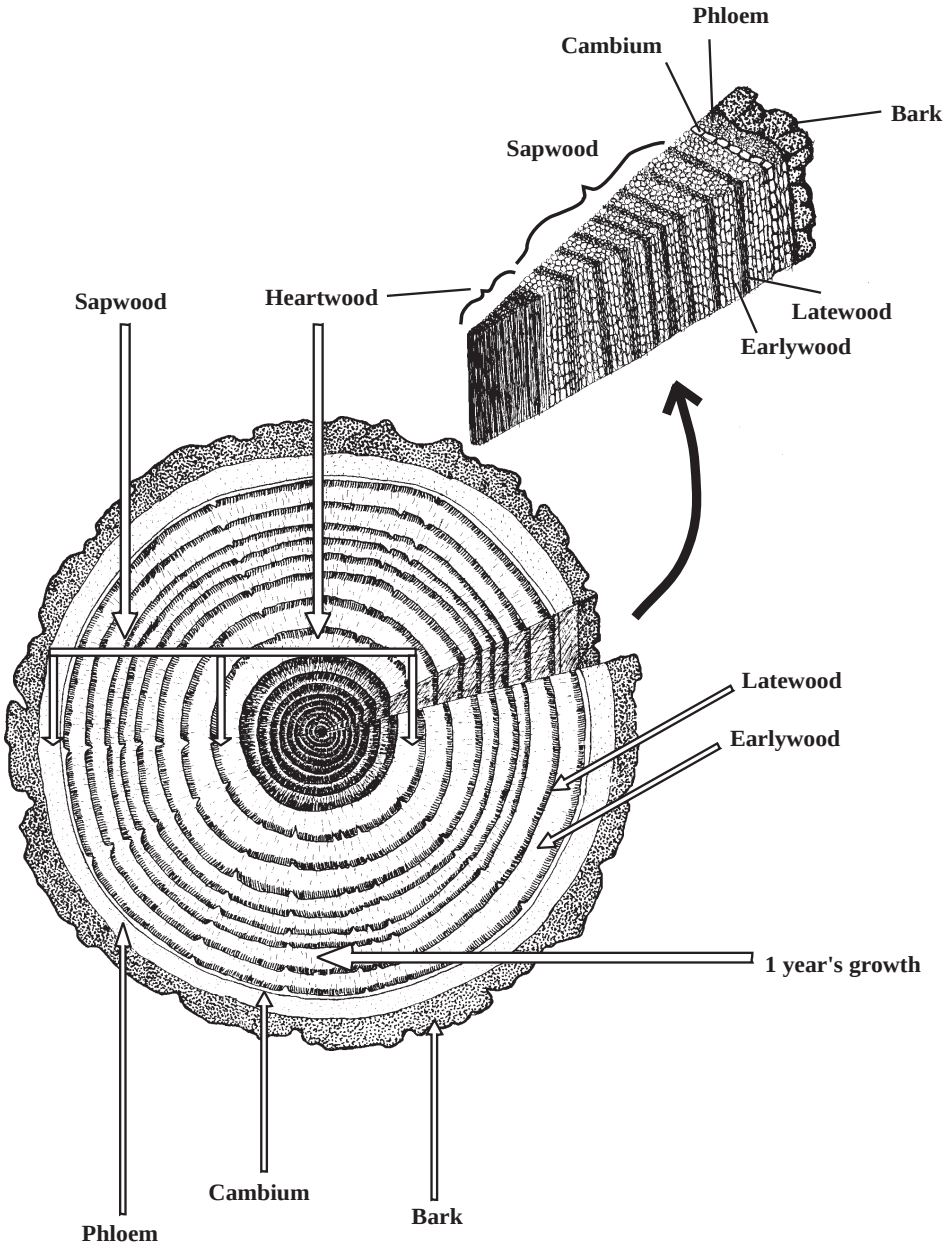
Water and nutrients are absorbed through the roots and transported up the trunk to the branches by cells in the sapwood. As water moves through a tree, most of the water is lost to the air by a process called **transpiration**. Tiny pores called **stomata** on the leaf surfaces open and allow carbon dioxide in and oxygen out of the leaf. When the pores open, water escapes from the tree. During transpiration, water loss "pulls" water and nutrients up from the roots.

Special cells in the phloem transport the dissolved sugars and nutrients from the leaves to all parts of the tree. This sticky liquid is called "sap."



Forming Tree Rings

As trees grow, they produce layers of cells that allow them to grow upward and outward. During the growing season, the cambium makes new cells that become part of the phloem, xylem, or more cambium. Early in the growing season, the cambium produces light-colored, thin-walled cells called **earlywood.** As growing slows later in the summer, a darker band of



thick-walled cells called **latewood** is produced. The two layers form a tree ring or annual growth ring. You can determine the age of the tree by counting only the dark or only the light concentric lines from the center of the tree to the outer edge. In temperate and northern climates, one growth ring is usually formed each year.

Seed Dispersal

Trees must produce and disperse seeds in order to survive as a species. Tree seeds come in a wide variety of shapes and sizes, each possessing special characteristics to aid in seed dispersal and survival. Tree seeds may be in the form of berries, nuts, or fruits. They may be transported by water, air, or animals.

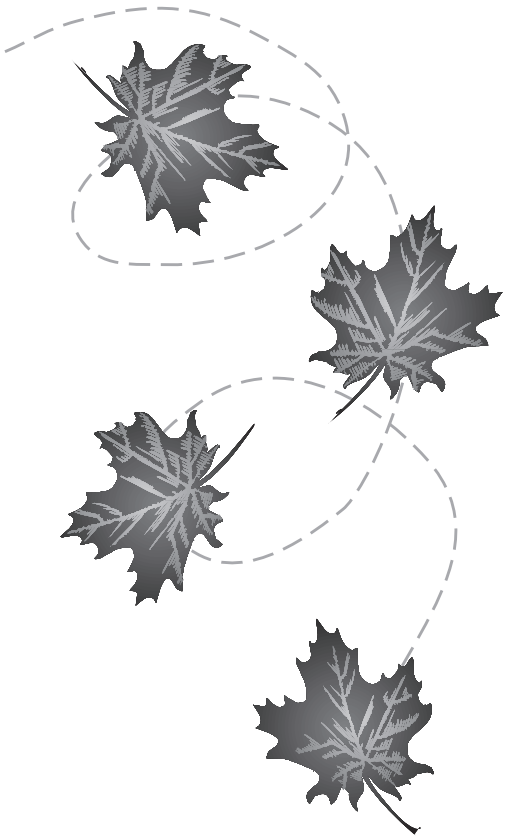
For example, cottonwoods produce seed pods that burst open, spilling thousands of white cottony seeds that float through the air to a new location. Maples have a winged seed or "helicopter" that spirals to the ground or is carried by the wind, and oaks produce acorns that fall from the trees and may find a sunny spot to sprout. Many acorns are also transported by wildlife such as squirrels, blue jays, and turkeys to be stored as a food source. Many times, the acorns are not eaten and sprout to become the next generation of oak trees.

Fall Foliage

Autumn leaf colors attract thousands of spectators each year, especially in the northeastern corner of Iowa. Leaves turn color in the fall due to chemical changes in the leaf tissues. These changes are initiated by a decrease in the length of sunlight. The best colors occur when conditions are clear, dry, and cool but without frost.

Leaf color comes from four kinds of pigments: chlorophyll (green), carotenes (oranges and yellows),

anthocyanins (red and purple), and tannins (brown). Pigments are present in the leaf all the time, but they are masked by green chlorophyll during the growing season. As the leaf dies, it stops producing chlorophyll and the other pigments show their colors.

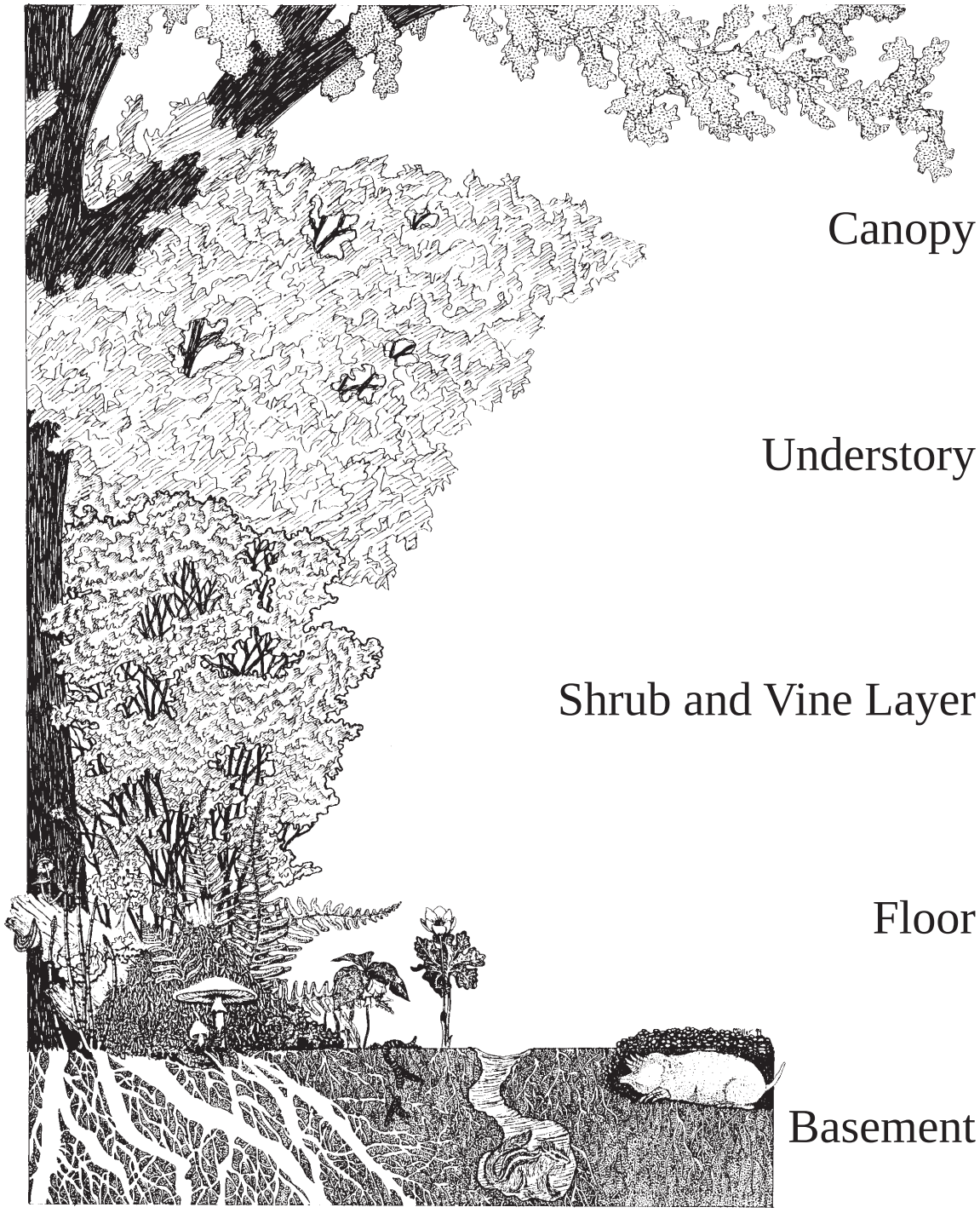


A Forest as an Apartment Building

A forest community is made up of several layers of life, including plants and animals. The **forest floor**—the ground floor of the apartment building—includes mosses, ferns, wildflowers, tree seedlings, and other low-growing plants that make up the herb layer. Hollow logs, leaf litter, fungi, and molds contribute to the forest floor. Moles, deer mice, bobwhite quail, numerous ground beetles, and larvae are some "tenants" of this layer.

Above the forest floor lies the **shrub layer.** Shrubs are smaller than trees, but have woody stems. Shrubs such as prickly ash, dogwood, and sumac, and vines such as poison ivy, grape, and bittersweet, make up this layer of the forest, which usually abounds with songbirds such as vireos and catbirds.

Trees make up the **understory** and **canopy** layers. The understory layer grows in the shade beneath the tallest trees. This layer consists of small shade-tolerant trees. The largest mature trees are considered part of the canopy layer which grows in full sunlight. It is the top floor of the forest which includes inhabitants such as bats, fox squirrels, orioles, and warblers.

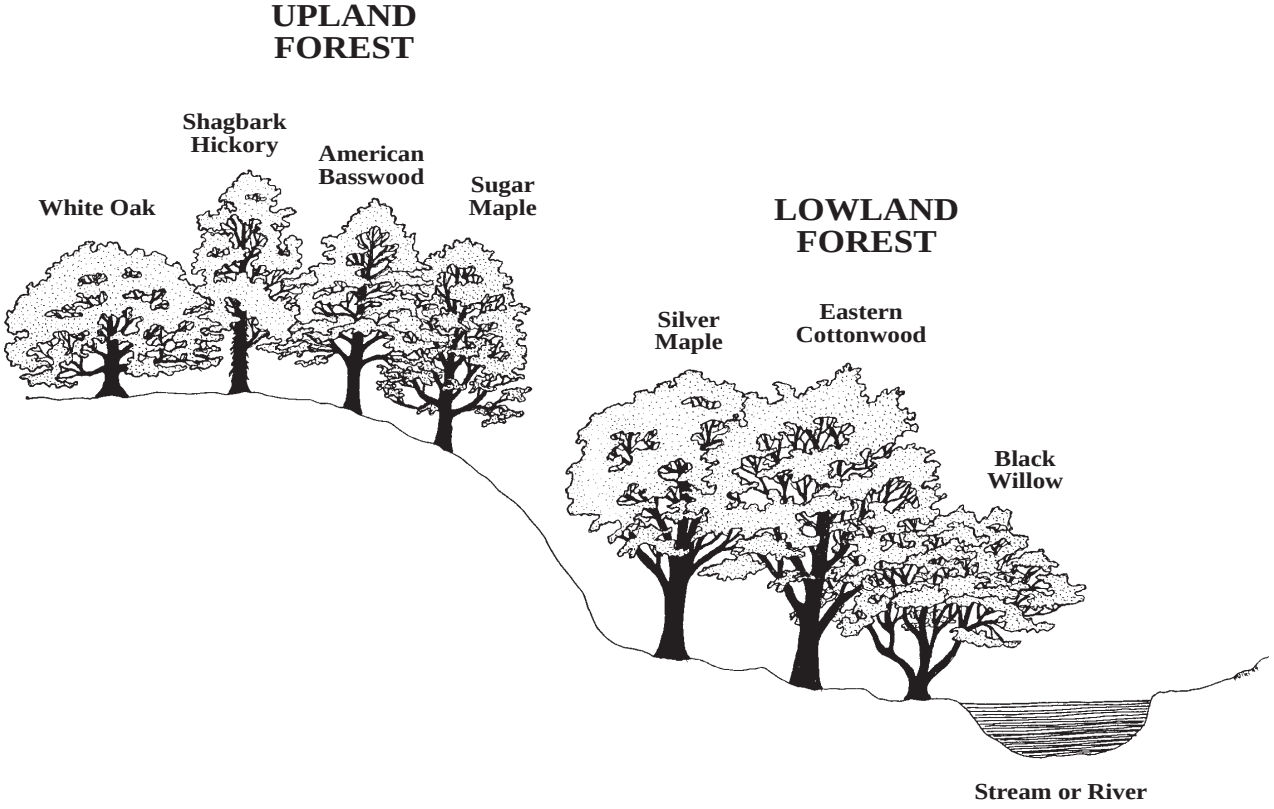


Communities of Trees

Where a certain tree species grows depends on a number of environmental factors, including topography, soil, temperature, moisture, and exposure.

Upland woodlands are found on areas above stream bottoms or flood plains. In Iowa, oaks and hickories typically dominate drier upland woodlands, mixed with white ash, basswood, and walnut trees. Understory species in upland communities include sugar maple, ironwood, and saplings of larger canopy trees. Another upland woodland community exists on more moist, well-drained soils with north- and east-facing slopes. This community is dominated by oak, sugar maple, and basswood trees.

Bottomland or lowland forests occur on floodplains and low-lying terraces in stream valleys. Typically, a lowland forest contains lush growths of cottonwood, silver maple, and green ash trees. Willows are usually found on the wetter bottomland areas.

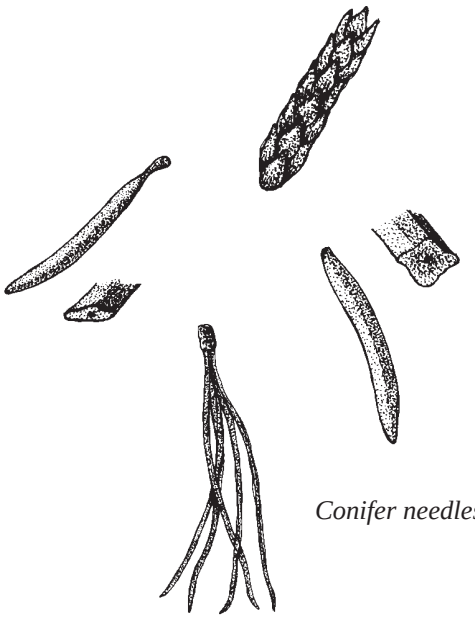


Iowa Tree Families

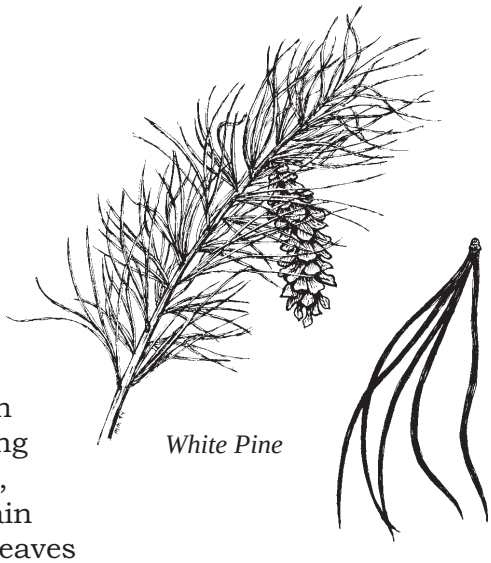
Iowa's trees come in all shapes and sizes—from majestic oaks to dense cedars, from graceful elms to spreading willows. A brief description of Iowa's most common trees follows. For more detailed information, consult additional resources listed later in this publication.

Conifer Trees

Pines are evergreen trees that produce cones and are called **conifers.** Pines are only one group of conifers; the others include cedars, firs, and spruces. Typically, species of conifers can be grouped by similar characteristics, especially based on type and arrangement of leaves. These characteristics include clumped needles, scaly leaves, flat needles, and square needles. Conifers in Iowa exist today in many habitats, but, historically, only five species of conifers were present in Iowa. These were white pine, balsam fir, eastern red cedar, common juniper, and Canada yew.



Conifer needles and leaves

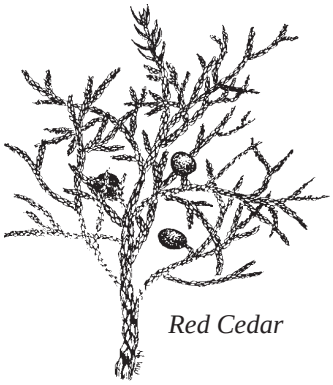


White Pine

Clumped Needles: The Pines (Genus *Pinus*)

Pines have leaves that are grouped together in bundles. Depending on the tree species, bundles may contain two, three, or five leaves or needles per bundle. The **white pine** *(Pinus strobus*) has needles in bundles of five that are very slender, soft, and flexible. White pine is the only pine native to Iowa. Many introduced species, such as Austrian pine and Scotch pine, are commonly planted as windbreaks and ornamentals.

Scaly Leaves: The Cedars



Red Cedar

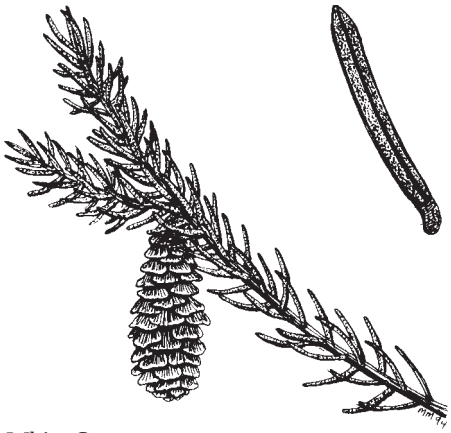
The leaves of **eastern red ceda**r may be scalelike or awl-like or may have both types of leaves on the same tree. It has an evergreen foliage with a dark green, blue-green, or reddish cast. It grows in a variety of habitats, from rocky cliffs to eroded land to poor gravelly soils. The fruit is a small berrylike cone that is blue and round. This juniper is native throughout Iowa. The **northern white cedar** *(Thuja occidentalis)* is often used for cemetery and windbreak plantings. It is not native to Iowa and has flattened scales.

Flat Needles: The Firs (Genus *Abies*)

Firs are tall, pyramid-shaped evergreens with flat one- to two-inch needles with blunt ends. Firs make popular Christmas trees because they tend not to lose their needles as readily as other conifer species. Fir cones are rarely found intact; the scales tend to fall off before the cones fall to the ground. The balsam fir has a very pleasant fragrance that makes it popular for Christmas trees. It is native to northeastern Iowa, where it is rare and grows on steep, sheltered slopes.

Square Needles: The Spruces (Genus *Picea*)

Spruces are popular in windbreaks. These evergreens have pointed needles and branches that drop low to the ground. Many spruces, such as **white spruce** (*Picea glauca*) and **Colorado blue spruce,** are not native to Iowa but are widely planted throughout the state as windbreaks and ornamental trees.



White Spruce

Human and Wildlife Uses of Conifers

Conifers are often planted because they make excellent windbreaks and noise buffers. Many people also plant "farms" of conifers to be sold as Christmas trees. From a lumber standpoint, conifers are used for pulp, posts, poles, railroad ties, and housing finishes. They provide excellent nesting habitats and winter shelter for wildlife, while cedar berries and other seeds are eaten by a variety of wildlife.

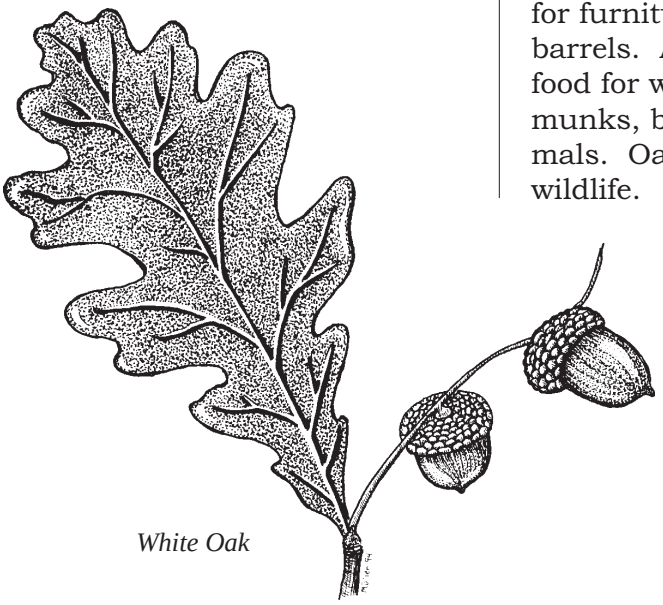
Deciduous Trees

Deciduous trees are trees that lose all of their leaves each year. In temperate regions such as Iowa, deciduous trees lose their leaves in the fall. We can classify deciduous trees in many ways, including fruit types.

Trees that Produce a Nut

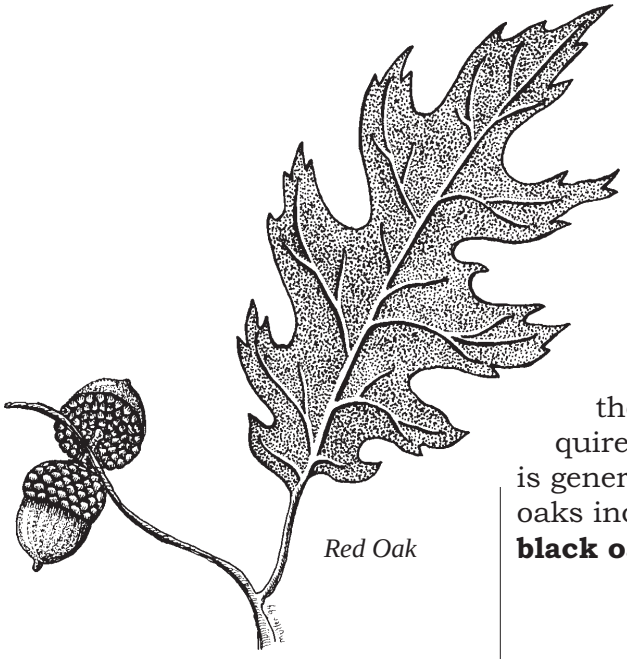
Oaks (Genus *Quercus*)

Known as Iowa's state tree, oaks are the main canopy tree species in the state. Most oaks have lobed leaves with either rounded or pointed edges. The wood is hard and strong and is used extensively for furniture, flooring, veneer, railroad ties, and barrels. Acorns are the fruits of oaks and valued food for wildlife including turkeys, squirrels, chipmunks, blue jays, and many other birds and mammals. Oaks also provide homes and nesting cover for wildlife.



White Oak

Burr Oak



Red Oak

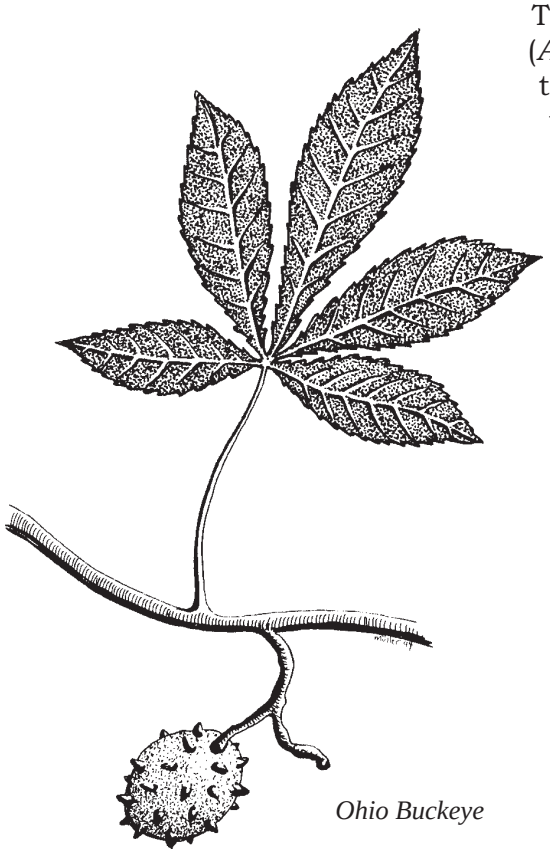
Two main groups comprise our native oaks: white oaks and red oaks. **White oaks** have leaves with rounded lobes and acorns that mature in one growing season. The light brown wood is watertight and is often used for making barrels to hold liquids. Native white oaks include **white oak** (*Quercus alba*) and **burr oak** (*Quercus macrocarpa*). The burr oak's acorn is the only one in Iowa with a fringe of bristles around the acorn's cap.

Red oaks have short bristles or points at the end of each leaf lobe. Red oak acorns require two growing seasons to mature, and the wood is generally pinkish to reddish brown. Common red oaks include **red oak** (*Quercus rubra*), **pin oak,** and **black oak.**

Horsechestnuts (Genus *Aesculus*)

The **horsechestnut** family consists of trees with opposite palmately-compound leaves. Horsechestnuts grow fairly quickly, and their fruits are important food for wildlife. These trees are commonly grown for ornamental plantings. The wood is lightweight and is used to make artificial limbs.

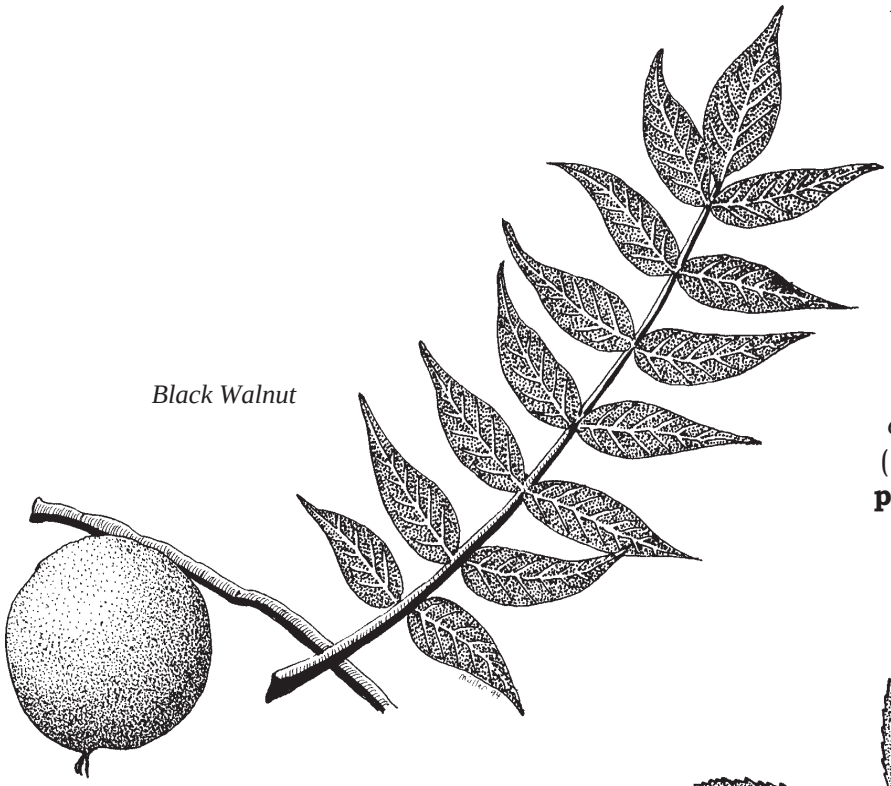
The **Ohio buckeye** (*Aesculus glabra*) has a fruit that is a large nutlike seed with smooth, shiny, dark brown coat and a leathery, spiny covering. The buckeye grows naturally in wooded river valleys across most of south and central Iowa.



Ohio Buckeye

Walnuts and Hickories (Genus *Juglans and* Genus *Carya)*

The **walnut** family includes walnut, hickory, butternut, and pecan trees. Members of this group have compound leaves and fruits with a hard nut and a green, semi-fleshy covering that turns black with age. Because of their sweet, oily nature, the nuts are an important food for wildlife and humans. The heartwood of walnut trees is used for gunstocks, furniture, and cabinets. Hickory wood is important for making handles of hammers, axes, and other tools because of its hard nature. It is also used for charcoal and meat-smoking. Species in this family include **black walnut** (*Juglans nigra*), **butternut** (*Juglans cinerea),* **shagbark hickory** (*Carya ovata*), **bitternut hickory** (*Carya cordiformis*), and **pecan** (*Carya illoensis*).

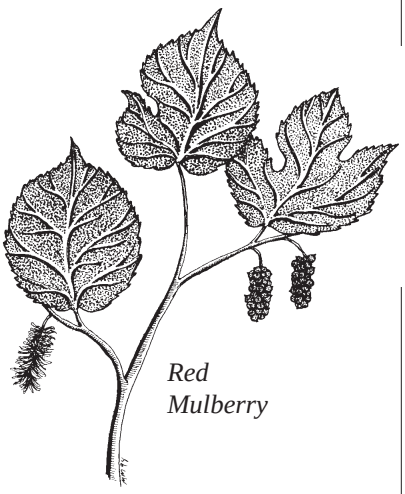


Black Walnut

Shagbark Hickory

Trees that Produce Soft Fruits

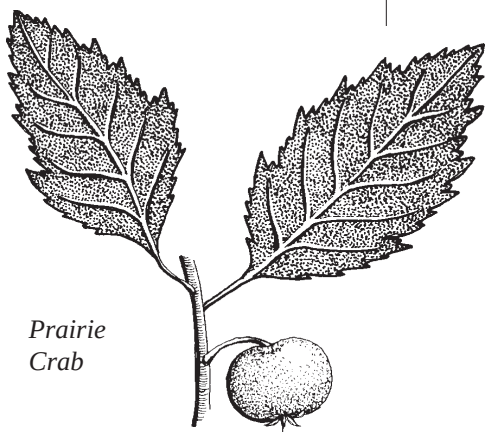
Mulberries (Genus *Morus*)



Red Mulberry

The **red mulberry** (*Morus rubra*) is a very common tree of floodplains and fencerows. Its berrylike fruit is a favorite food of birds and other wildlife. As they feed on the fruits, animals spread mulberry seeds. Mulberry leaves are variable in size and shape with toothed margins and heart-shaped bases. Its wood is used locally for fenceposts, but it isn't exported commercially. **White mulberry** is an introduced species found throughout the state.

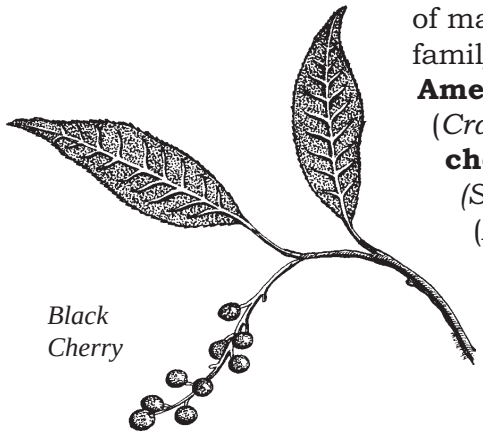
Rose Family



Prairie Crab

Trees in the rose family have fruits that may be applelike, plumlike, or cherrylike. With the exception of black cherry, these trees are usually short and shrubby (less than 30 feet tall) and grow in open woods, fencerows, and pastures. Trees in this family may also have thorns or prickles on their branches. Many species are found in dense thickets and thus are important cover for wildlife species. Humans and wildlife relish the fruits

American Plum



Black Cherry

of many of these trees. Examples of trees in this family include the **prairie crab** (*Pyrus ioensis*), **American plum** (*Prunus americana*), **hawthorns** (*Crataegus*), **black cherry** (*Prunus serotina*), **chokecherry** (*Prunus virginiana*), **mountain ash** *(Sorbus americana)*, and **serviceberry** (*Amelanchier arborea*).

Other Trees Produced by Seeds

Birches

River Birch

Most people think of white and peeling bark when they think of birch trees. However, many members of this family have smooth bark. The leaves are simple with toothed edges. This family includes the hornbeams and birches. The fruits are eaten by wildlife year round, as they persist during winter months. The male flowers, called **catkins**, are also an important winter food for some wildlife. Wood from the hornbeams is very strong and was used historically for mallets, tool handles, levers, and wheels; birch wood is soft and is used for paper and pulp. Typical species in this group include **river birch** (*Betula nigra*), **paper birch** (*Betula papyrifera*), **yellow birch** (B*etula alleghaniensis*), **hornbeam** (*Carpinus caroliniana*), and **ironwood** or **hop hornbeam** (*Ostrya virginiana*).

Ironwood

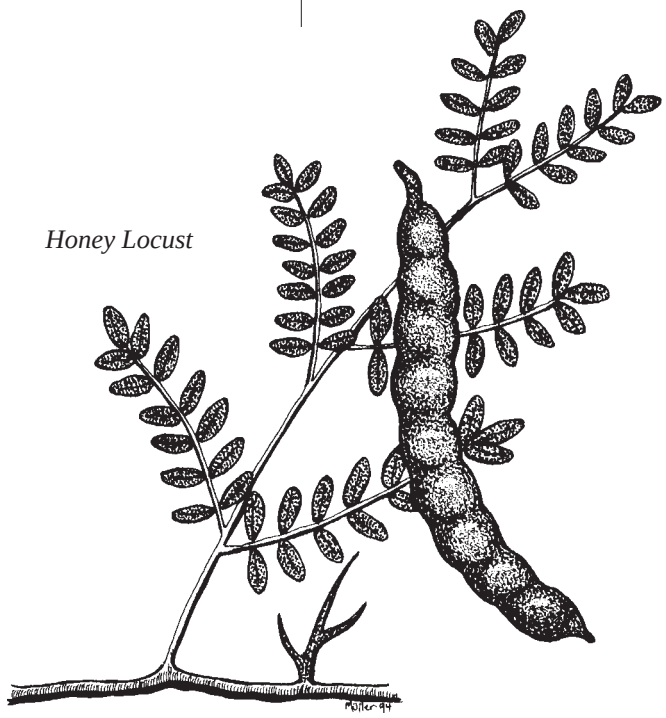
Elms

The elm family consists of elms and hackberries. **Hackberry** (*Celtis occidentalis*) is best identified by its rough, warty bark and toothed leaves with unequal bases. Hackberries resist wind damage and drought, and people are encouraged to plant them as street and shade trees. Its fruit is a dark purple seed that persists on twigs into the winter, making it a useful winter food for songbirds. Its wood is used for furniture, sporting goods, and plywood veneer.

The tall, graceful **American elm** (*Ulmus americana*) was once the most popular street and yard tree in America. Its demise was due to the spread of Dutch elm disease, caused by an introduced fungus. Today, large American elm trees are rare. American elms are fast-growing, adaptable trees that develop a vase-shaped crown. The leaves have unequal bases and toothed edges. Elms produce a one-seeded winged fruit called a **samara.** The wood is white, hard, heavy, and strong and was once used for veneer, boxes, and furniture. Another elm, the **slippery elm** (*Ulmus rubra*), is also native to Iowa, and its wood has similar uses.

Locusts

Members of the locust or legume family have compound leaves and fruits that are pods. A common example is the **honey locust** (*Gleditsia triacanthos*). Typically, honey locusts bear thorns on their branches or trunk, but cultivated varieties have been produced without thorns. Locust trees are now popular shade trees. The wood of this species is hard and durable and used for fence posts, railroad ties, furniture, and fuel. The fruits are eaten by wildlife and, historically, by humans. Another native legume is the **Kentucky coffee tree** (*Gymnocladus dioicus*).



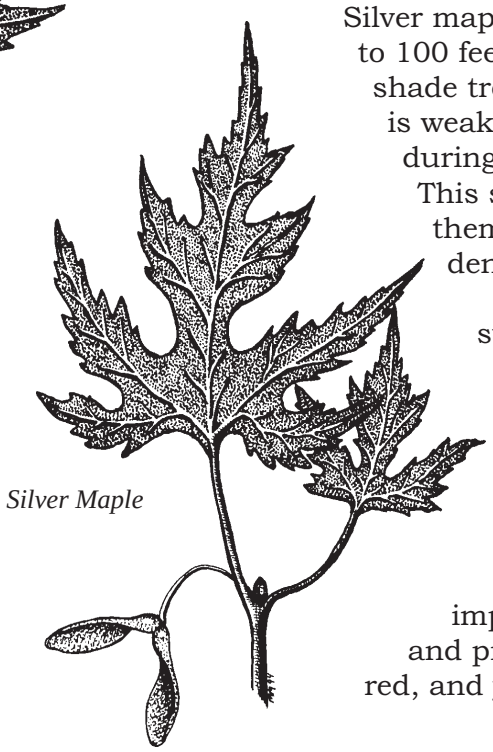
Honey Locust

Maples (Genus *Acer*)

Box Elder

Maples are very popular and easily recognized shade trees, probably best known as a source of maple syrup. Most maples have simple leaves, palmately lobed and opposite in arrangement. However, the box elder is a maple tree that has a compound leaf, resembling the ashes. The trees are also known for their winged samara or "helicopter" fruits.

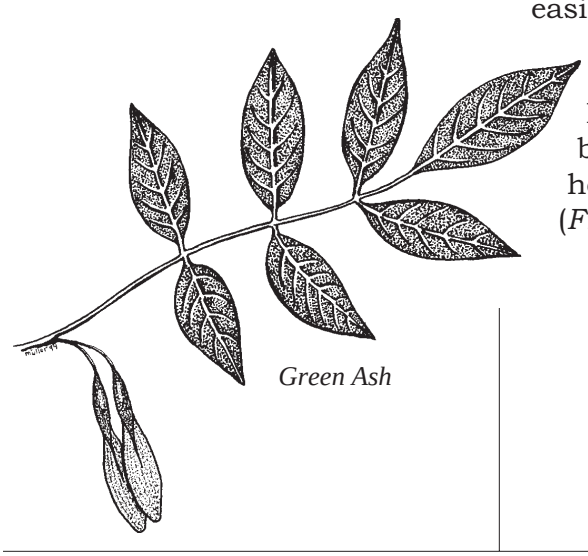
Maples that grow fast have weak limbs and soft wood and are known as soft maples. Examples of soft maples include **box elder** (*Acer negundo*) and **silver maple** (*Acer saccharinum*). Silver maple trees grow very tall (60 to 100 feet) and are very popular shade trees. However, the wood is weak and limbs often break during ice and wind storms. This soft wood also makes them valuable for wildlife dens.



Silver Maple

Black maple and sugar maple are two species of hard maples. Compared to soft maples, they grow much more slowly and have a harder, heavier wood that is more valuable. Hard maples are important as shade trees and produce beautiful orange, red, and yellow colors in the fall.

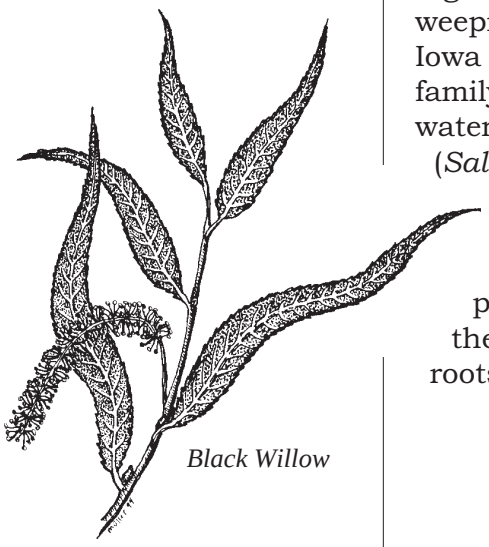
Ashes (Genus *Fraxinus*)



Green Ash

Ash trees are common shade trees because they grow rapidly, thrive in a variety of soils, and are easily transplanted. The leaves are compound with toothed edges. The fruits are paddle-shaped and are dispersed by the wind. Ash wood is very hard and is used for sporting goods such as baseball bats, oars, paddles, snowshoes, and hockey sticks. Examples include the **green ash** (*Fraxinus pennsylvanica*) and **white ash**.

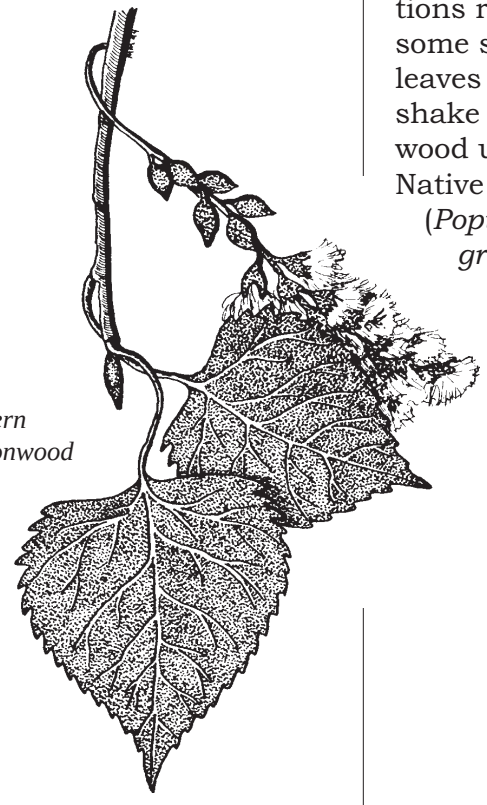
Willows (Genus *Salix)*



Black Willow

Most Iowans identify willow trees with the weeping willow, a popular cultivated shade tree. However, weeping willows are not found natively in the state. Iowa does have several representatives of the willow family, which typically grow along wetlands and waterways. These examples include **black willow** (*Salix nigra*) and **sandbar willow.** Willows have small fluffy seeds that are dispersed by wind and are attached to tiny, long, silky hairs. Black willow wood is used for artificial limbs, paper pulp, and furniture. Fish often bask in the shade willows provide along streams. Willow roots stabilize stream banks of Iowa's deep soils.

Poplars (Genus *Populus*)



Eastern Cottonwood

Poplars are closely related to willows and are usually found in moist areas. The fluffy cottony seeds drift through the air and colonize new locations rapidly. Poplars are very fast-growing, and some species can reach heights of 100 feet. The leaves have thin, flattened stems that allow them to shake in the slightest breeze. Poplars have light, soft wood used for paper pulp, pallets, boxes, and veneer. Native species in Iowa include **eastern cottonwood** (*Populus deltoides*), **bigtooth aspen** (*Populus grandidentata*), and **quaking aspen. White poplar** is a poor shade tree and is non-native. All poplars are popular food for beavers and are frequently found in beaver dens and food caches. Poplars are also used by winter browsers like rabbits and deer.

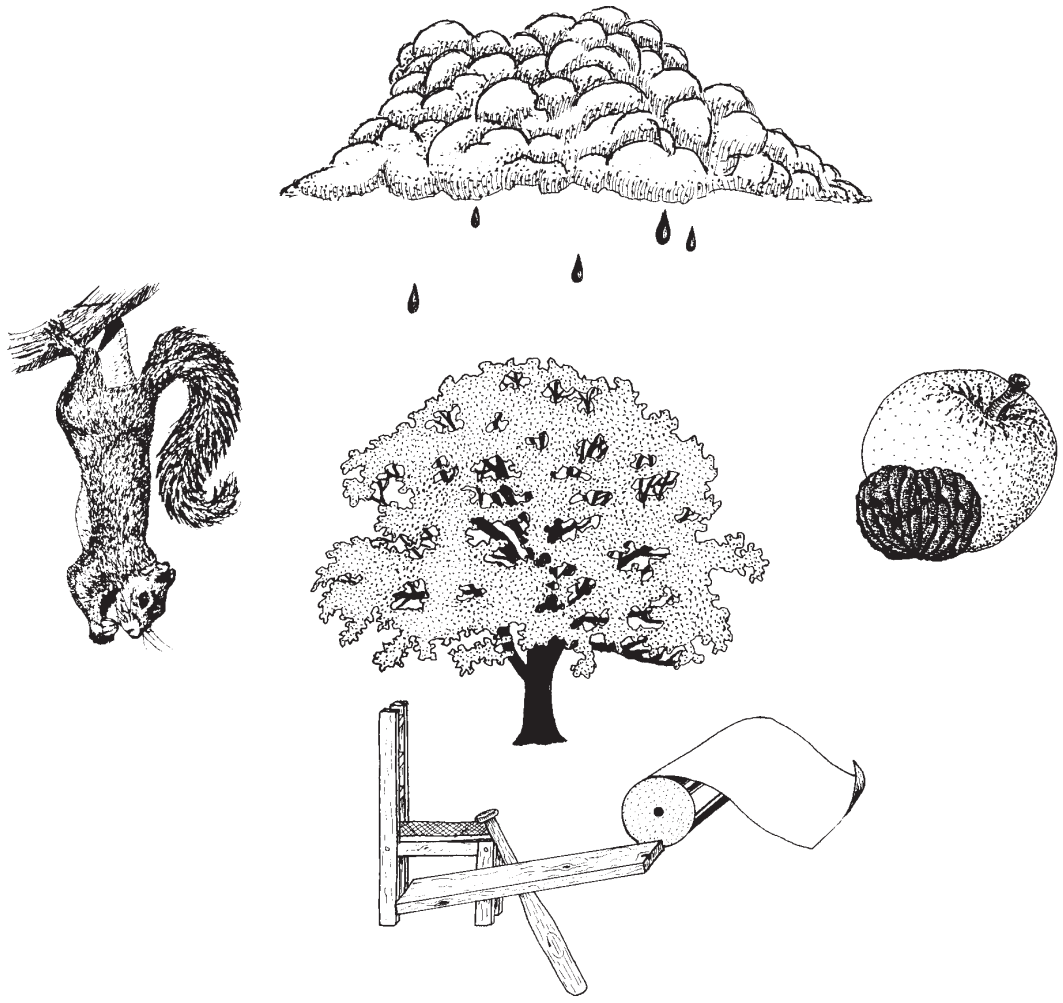
Bigtooth Aspen

Basswoods (Genus *Tilis*)

Basswood, or linden, grows quickly and often produces sprouts from the bases of their trunks, forming characteristic sucker shoots. Young trees have silvery smooth bark. The leaves are large and heart-shaped with toothed margins. Fruits are dry round seeds that dangle from a leaflike bract. Their fragrant flowers are favorites for honeybees, and basswood heartwood decays easily, making a hollow space for wildlife homes. The wood doesn't impart taste or odor to food, so it is commonly used for honeycomb frames, boxes, crates, and toothpicks.

Use of Tree Products

The list for tree uses is seemingly endless. Trees provide lumber, paper products, resins, fruits, nuts, rubber, coffee, chocolate, fuel, cork, tannin, medicines, and adhesives, just to name a few. Trees are a renewable resource that keep giving and giving, as long as we manage them wisely.



How Trees Benefit the Environment

It is hard to imagine a world without trees. Their roots help reduce soil erosion by anchoring trees into the ground and holding soil in place. Trees act as buffers between streams and cropfields to reduce soil runoff and bank erosion. Their leaves deflect heavy rains, allowing the water to percolate slowly into the soil.

Trees provide valuable shelter for wildlife. Farmstead windbreaks and shade trees protect homes, buildings, and livestock from icy winter winds and summer sun. Well-managed woodlots can be a source of fuel and other products. Urban trees beautify streets, homes, and parks. They also produce oxygen, clean the air, reduce noise, lower summer temperatures, protect from winter winds, attract songbirds, and create natural elements in the city.

Useful Resources

"Forest and Shade Trees of Iowa," Peter Van der Linden and Donald Farrar, Iowa State University Press, Ames, IA, 1984.

"Identification of Conifer Trees in Iowa," Paul H. Wray, Iowa State University Extension, Ames, IA, 1993.

"Identification of Hardwood Trees in Iowa," Paul H. Wray, Iowa State University Extension, Ames, IA, 1993.

"Iowa Supplement to Project Learning Tree," Iowa Department of Natural Resources, Des Moines, IA, 1993.

"North American Trees," Richard Preston, Iowa State University Press, Ames, IA, 1976.

"NatureScope—Trees are Terrific," National Wildlife Federation, Washington, D.C., 1988.

"Tree, Eye Witness Books," Alfred A. Knopf, New York, NY, 1988.

"Tree Growth," Amy Kuehl, Iowa State University Forestry Extension Notes, Ames, IA, 1993.

"Trees, A Golden Guide," Herbert S. Zim and Alexander C. Martin, Golden Press, New York, NY, 1987.

"Tree Project Handbook," Trees Forever, Marion, IA, 1991.

"Trees for Kids," Iowa Department of Natural Resources, Des Moines, IA, 1992.

Notes

Notes

Iowa's Trees is one in a series of seven booklets that are part of the *Iowa Plants Series*. The booklets in the series include:

Iowa Plants

Iowa's Spring Wildflowers	(IAN-301)
Iowa's Summer and Fall Wildflowers	(IAN-302)
Benefits and Dangers of Iowa Plants	(IAN-303)
Iowa's Trees	(IAN-304)
Seeds, Nuts, and Fruits of Iowa Plants	(IAN-305)
Iowa's Mushrooms and Other Nonflowering Plants	(IAN-306)
Iowa's Shrubs and Vines	(IAN-307)

The Iowa Association of Naturalists also has produced five other booklet series that provide readers with a clear, understandable overview of topics concerning the Iowa environment and conservation. The booklets included in each of the other five series are listed below.

Iowa Physical Environment Series

Iowa Weather	(IAN-701)
Iowa Geology and Fossils	(IAN-702)
Iowa Soils	(IAN-703)

Iowa Wildlife Series

Iowa Mammals	(IAN-601)
Iowa Winter Birds	(IAN-602)
Iowa Nesting Birds	(IAN-603)
Iowa Reptiles and Amphibians	(IAN-604)
Iowa Fish	(IAN-605)
Iowa Insects and Other Invertebrates	(IAN-606)

Iowa's Natural Resource Heritage

Changing Land Use and Values	(IAN-501)
Famous Iowa Conservationists	(IAN-502)
Iowa's Environmental Laws	(IAN-503)
Conservation Careers in Iowa	(IAN-504)

Iowa Wildlife and People

Iowa Wildlife and Management	(IAN-401)
Keeping Iowa Wildlife Wild	(IAN-402)
Misconceptions About Iowa Wildlife	(IAN-403)
State Symbols of Iowa	(IAN-404)
Iowa Food Webs and Other Interrelationships	(IAN-405)
Natural Cycles in Iowa	(IAN-406)
Iowa Biodiversity	(IAN-407)
Adapting to Iowa	(IAN-408)

Iowa's Biological Communities

Iowa's Biological Communities	(IAN-201)
Iowa Woodlands	(IAN-202)
Iowa Prairies	(IAN-203)
Iowa Wetlands	(IAN-204)
Iowa Waterways	(IAN-205)

Iowa Environmental Issues

Iowa Habitat Loss and Disappearing Wildlife	(IAN-101)
Iowa Air Pollution	(IAN-102)
Iowa Water Pollution	(IAN-103)
Iowa Agricultural Practices and the Environment	(IAN-104)
People, Communities, and Their Iowa Environment	(IAN-105)
Energy In Iowa	(IAN-106)
Iowa Waste Management	(IAN-107)

√ Booklets may be ordered through the Iowa State University Extension Service at a cost of $1.00 per booklet. When ordering, be sure to use the IAN number to the right of each listed booklet title. Please send written orders and payment to:

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